

IN THE CLAIMS:

17. (Previously presented) A method for assembling a valve stem to a wheel rim having an aperture formed therein comprising the steps of
- determining a location of the aperture as the wheel rim passes through a gauging station;
 - coaxially aligning a central axis of the aperture and a longitudinal axis of the valve stem with respect to one another prior to insertion of the valve stem through the aperture; and
 - moving the valve stem relative to the rim along a programmable path of travel during the coaxially aligning step and along the aligned axes to insert the valve stem through the aperture, the path of travel defined with a programmable robotic manipulator having an arm capable of compound, multi-axial movement and having a plurality of programmed paths corresponding to a plurality of different size wheel rim and valve stem combinations to be assembled.
18. (Previously presented) The method of claim 17 wherein the determining step further comprises the step of
- identifying at least one physical feature of the rim with a machine vision system.
19. (Previously presented) The method of claim 17 wherein the aligning step further comprises the step of:
- selectively moving the valve stem to the gauging station from one of a plurality of valve stem delivery stations as the location of the aperture in response to the determining step, each delivery station having a differently configured valve stem mounted thereon.
20. (Previously presented) The method of claim 17 wherein the determining step further comprises the step of
- identifying the rim as one of a plurality of different types of rims in response to inspection with a machine vision system.

21. (Previously presented) The method of claim 17 wherein the determining step further comprises the steps of:

directing an optical sensor at the rim;

rotating the optical sensor about the rim; and

stopping rotation of the optical sensor about the rim when the optical sensor is directed at the aperture.

22. (Previously presented) The method of claim 17 further comprising the step of:

tightening a nut over a threaded portion of the valve stem extending from the rim after the valve stem has been inserted with respect to the aperture.

23. (Previously presented) The method of claim 22 wherein the nut is tightened to the valve stem by a nut runner mounted on the robotic manipulator.

24. (Cancelled)

25. (Previously presented) The method of claim 17 further comprising the step of:

conveying valve stems to the delivery station with conveying means.

26. (Previously presented) The method of claim 17 wherein the moving step further comprises the steps of:

holding the rim substantially stationary; and

urging the valve stem toward the rim with the robotic manipulator.

27. (Cancelled)

28. (Previously presented) The method of claim 17 further comprising the steps of:

grasping the valve stem with the robotic manipulator; and

moving along the path of travel in response to computer-controlled programmed signals.

29. (Previously presented) The method of claim 28 further comprising the step of:

actuating the robotic manipulator to move the valve stem to the rim located at a delivery station.

30. (Previously presented) The method of claim 17 further comprising the step of:

grasping the valve stem with the robotic manipulator computer-controlled and having a valve-stem-gripper-attachment articulatable and positionable to be in a predetermined orientation with respect to the aperture in the rim.

31. (Cancelled)

32. (Cancelled)

33. (Previously presented) An apparatus for assembling a valve stem to a wheel rim having an aperture formed therein comprising:
means for determining a location of the aperture as the wheel rim passes through a gauging station;
means for coaxially aligning the central axis of the aperture and a longitudinal axis of the valve stem with respect to one another prior to insertion of the valve stem through the aperture; and
means for moving the valve stem relative to the rim along a programmable path of travel including alignment of the central axis of the aperture with the longitudinal axis of the valve stem and along the aligned axes to insert the valve stem through the aperture, the path of travel defined with a programmable robotic manipulator having arm capable of compound, multi-axial movement and having a plurality of programmed paths corresponding to a plurality of different size wheel rim and valve stem combinations to be assembled.

34. (Previously presented) The apparatus of claim 33 wherein the means for determining further comprises:

a machine vision system to identify at least one physical feature of the rim.

35. (Previously presented) The apparatus of claim 34 wherein the aligning means further comprises:

the robotic manipulator to selectively move the valve stem from one of a plurality of delivery stations having different valve stems mounted thereon in response to the identification by the machine vision system.

36. (Previously presented) The apparatus of claim 33 wherein the means for determining further comprises:

a machine vision system to identify the rim as being one of a plurality of different rims.

37. (Previously presented) The apparatus of claim 33 further comprising: means for tightening having a nut runner mounted on the robotic manipulator.

38. (Cancelled)

39. (Currently Amended) The apparatus of claim 33 further comprising:

means for supplying valve stems in a sorted orientation to a delivery station where the valve stem is moved relative to the rim to insert the valve stem with respect to the aperture.

40. (Previously presented) The apparatus of claim 33 wherein the means for moving further comprises:

the robotic manipulator to urge the valve stem toward the rim.

41. (Cancelled)

42. (Previously presented) The apparatus of claim 33 further comprising:

means for grasping the valve stem with the robotic manipulator computercontrolled and having a valve-stem-gripper-attachment articulatable and positionable to be in a predetermined orientation with respect to the aperture in the rim.

43. (Cancelled)

44. (Previously presented) A method for assembling a valve stem to a wheel rim having an aperture formed therein comprising the steps of:

determining the location of the valve stem aperture in the rim; and

operably engaging the valve stem with a robotic manipulator; moving the valve stem relative to the rim along a programmable path of travel;

coaxially aligning the valve stem and the aperture; and

inserting at least a portion of the valve stem through the aperture in the rim, wherein the path of travel is defined with a programmable robotic manipulator having an arm capable of compound, multi-axial movement and having a plurality of programmed paths corresponding to a plurality of different size wheel rim and valve stem combinations to be assembled.

45. (Previously presented) The method according to 44 further comprising the steps of:

operably engaging the valve stem.; and

moving the valve stem towards the rim.

46. (Previously presented) The method according to claim 44 further comprising the step of:

securing the valve stem to the rim by tightening a nut over a threaded portion of the valve stem extending from the rim.

47. (Previously presented) The method of claim 44 further comprising the step of:

grasping the valve stem with the robotic manipulator computer-controlled and having a valve-stem-gripper-attachment articulatable and positionable to be in a predetermined orientation with respect to the aperture in the rim.

48. (Cancelled)

49. (Cancelled)

50. (Previously Presented) An apparatus for assembling a valve stem to a wheel rim having an aperture formed therein comprising:

means for determining the location of the valve stem aperture in the rim; and means for operably engaging the valve stem;

means for programmably moving the valve stem relative to the rim along a programmable path of travel; and

means for coaxially aligning the valve stem and the aperture to insert at least a portion of the valve stem through the aperture in the rim, wherein the path of travel is defined with a programmable robotic manipulator having an arm capable of compound, multi-axial movement and having a plurality of programmed paths corresponding to a plurality of different size wheel rim and valve stem combinations to be assembled.

51. (Previously Presented) The apparatus of claim 50 further comprising:

means for grasping the valve stem with the robotic manipulator computercontrolled and having a valve-stem-gripper-attachment articulatable and positionable to be in a predetermined orientation with respect to the aperture in the rim.

52. (Cancelled)

53. (Cancelled)